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SECRET COMMUNICATION SYSTEM

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This invention relates broadly to secret communication systems involving the use of carrier waves of different frequencies, and is especially useful in the remote control of dirigible craft, such as torpedoes.

An object of the invention is to provide a method of secret communication which is relatively simple and reliable in operation, but at the same time is difficult to discover or decipher.

Briefly, our system as adapted for radio control of a remote craft, employs a pair of synchronous records, one at the transmitting station and one at the receiving station, which change the tuning of the transmitting and receiving apparatus from time to time, so that without knowledge of the records an enemy would be unable to determine at what frequency a controlling impulse would be sent. Furthermore, we contemplate employing records of the type used for many years in player pianos, and which consist of long rolls of paper having perforations variously positioned in a plurality of longitudinal rows along the records. In a conventional player piano record there may be 88 rows of perforations, and in our system such a record would permit the use of 88 different carrier frequencies, from one to another of which both the transmitting and receiving station would be changed at intervals. Furthermore, records of the type described can be made of substantial length and may be driven slow or fast. This makes it possible for a pair of records, one at the transmitting station and one at the receiving station, to run for a length of time ample for the remote control of a device such as a torpedo.

The two records may be synchronized by driving them with accurately calibrated constant-speed spring motors, such as are employed for driving clocks and chronometers. However, it is also within the scope of our invention to periodically correct the position of the record at the receiving station by transmitting synchronous impulses from the transmitting station. The use of synchronizing impulses for correcting the phase relation of rotary apparatus at a receiving station is well-known and highly developed in the fields of automatic telegraphy and television.

Other more specific objects and features of our invention will appear from the following detailed description of a particular embodiment thereof, as illustrated in the drawings, in which

Fig. 1 is a schematic diagram of the apparatus at a transmitting station;

Fig. 2 is a schematic diagram of the apparatus at a receiving station;

Fig. 3 is a schematic diagram illustrating a starting circuit for starting the motors at the transmitting and receiving stations simultaneously;

Fig. 4 is a plan view of a section of a record strip that may be employed;

Fig. 5 is a detail cross section through a record-responsive switching mechanism employed in the invention;

Fig. 6 is a sectional view at right angles to the view of Fig. 5 and taken substantially in the plane VI—VI of Fig. 5, but showing the record strip in a different longitudinal position; and

Fig. 7 is a diagram in plan illustrating how the course of a torpedo may be changed in accordance with the invention.

Referring first to Fig. 7, there is disclosed a mother ship 10 which at the beginning of operations occupies the position 10*a* and at the end of the operations occupies the position 10*b*. This mother ship discharges a torpedo 11 that travels successively along different paths 12, 13, 14, 15 and 16 to strike an enemy ship 17, which initially occupies the position 17*a* but which has moved into the position 17*b* at the time it is struck by the torpedo 11. According to its original course, the enemy ship 17 would have reached the position 17*c*, but it changed its course following the firing of the torpedo, in an attempt to evade the torpedo.

In accordance with the present invention, the torpedo 11 can be steered from the mother ship 10*a* and its course changed from time to time as necessary to cause it to strike its target. In directing the torpedo it may, under some circumstances, be observed directly from the mother ship 10, or its course may be followed by an observer in an airplane 18 who communicates his findings to the mother ship 10*a*. It is also possible to control the torpedo directly from the airplane 18 if the latter is equipped with the necessary synchronous transmitting equipment in accordance with the invention.

Under the particular circumstances of Fig. 7, the enemy ship 17 was traveling in a straight line substantially parallel to the mother ship 10 at the time the torpedo was discharged, and the latter was directed forwardly at a substantial angle to compensate for the speed of the ship 17 and for water currents represented by the small arrows 19. However, as a result of the change in course of the enemy ship 17*a* and the effect of the water currents, it is observed that